

## REMARKS

### Claim Rejections 35 U.S.C. § 102 (b)

#### Claims 14-17

The Examiner has rejected claims 14-17 under 35 U.S.C. § 102 (b) as being anticipated by Inoue et al. (US 5,984,165).

Applicants respectfully disagree with the Examiner. Applicants have amended claim 14. Support is provided by paragraph 33 in the specification.

Claim 14, as amended, claims a self-aligned mechanical joint (227) including: a bump (157) on a die, the bump including electroplated copper; and a solder (167) on a substrate wherein the solder was reflowed by indirect heat through conduction from the bump upon absorption of microwave energy by the die. See Figure 3.

In contrast, the Inoue et al. reference cited by the Examiner teaches bonding of multiple solder bumps (3) on the underside of a "bare chip (flip chip, chip part)" (2) to a "board (base material)" (1), but fails to teach solder on the "board (base material)". See Figure 1. Also, see Col. 6, lines 9-11.

In the opinion of the Examiner, Inoue et al. teaches microwave energy. However, contrary to the assertion of the Examiner, Inoue et al. clearly only teaches an "infrared heater (40) (infrared lamp, electromagnetic wave irradiating apparatus)" to melt the bumps (3) to bond the bare chip (2) to the base material (1). See Col. 6, lines 35-36.

Thus, the Inoue et al. reference cited by the Examiner does not teach each and every element of Applicants' invention, as claimed in claim 14, as amended. Claims

15-17 are dependent on claim 14, as amended, and, thus, are also not anticipated by Inoue et al.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claims 14-17 under 35 U.S.C. § 102 (b).

### **Claims 14-17**

The Examiner has rejected claims 14-17 under 35 U.S.C. § 102 (b) as being anticipated by Casson et al. (US 5,261,593).

Applicants respectfully disagree with the Examiner. Applicants have amended claim 14. Support is provided by paragraph 33 in the specification.

Claim 14, as amended, claims a self-aligned mechanical joint (227) including: a bump (157) on a die, the bump including electroplated copper; and a solder (167) on a substrate wherein the solder was reflowed by indirect heat through conduction from the bump upon absorption of microwave energy by the die. See Figure 3.

In contrast, the Casson et al. reference cited by the Examiner teaches direct heating in a reflow oven so solder bumps (51) on a flip chip (10) mix and dissolve into solder particles (53) that have liquefied on a substrate (30) followed by cooling and solidification to form an electrical connection (50) that is not self-aligned. See Figure 5A. Also, see Col. 14, lines 56-68.

In the opinion of the Examiner, Casson et al. teaches microwave energy. However, contrary to the assertion of the Examiner, Casson et al. clearly only teaches “ a infrared reflow oven, a vapor phase reflow oven, or a convection reflow oven” . See Col. 5, lines 24-26.

Thus, the Casson et al. reference cited by the Examiner does not teach each and every element of Applicants’ invention, as claimed in claim 14, as amended.

Claims 15-17 are dependent on claim 14, as amended, and, thus, are also not anticipated by Casson et al.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claims 14-17 under 35 U.S.C. § 102 (b).

### **Claims 14-17**

The Examiner has rejected claims 14-17 under 35 U.S.C. § 102 (b) as being anticipated by Sweitzer et al. (US 5,615,477).

Applicants respectfully disagree with the Examiner. Applicants have amended claim 14. Support is provided by paragraph 33 in the specification.

Claim 14, as amended, claims a self-aligned mechanical joint (227) including: a bump (157) on a die, the bump including electroplated copper; and a solder (167) on a substrate wherein the solder was reflowed by indirect heat through conduction from the bump upon absorption of microwave energy by the die. See Figure 3.

The Sweitzer et al. reference cited by the Examiner follows the patent by Casson et al. See Col. 10, lines 50-53.

In particular, Sweitzer et al. teaches direct heating in a reflow oven so solder bumps (16a-d) on a flip chip (10) mix and dissolve into solder paste (37) that has been stenciled by screen printing onto active contact pads on a printed circuit substrate (30) to form interconnections that are not self-aligned. See Figure 3B. Also, see Col. 10, line 50, to Col. 12, line 24.

In the opinion of the Examiner, Sweitzer et al. teaches microwave energy. However, contrary to the assertion of the Examiner, Sweitzer et al. also clearly only teaches " a infrared reflow oven, a vapor phase reflow oven, or a convection reflow oven" . See Col. 12, lines 2-3.

Thus, the Sweitzer et al. reference cited by the Examiner does not teach each and every element of Applicants' invention, as claimed in claim 14, as amended. Claims 15-17 are dependent on claim 14, as amended, and, thus, are also not anticipated by Sweitzer et al.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claims 14-17 under 35 U.S.C. § 102 (b).

### Claims 14-17

The Examiner has rejected claims 14-17 under 35 U.S.C. § 102 (b) as being anticipated by Koopman et al. (US 5,615,477). See page 3 of the Office Action mailed February 4, 2005.

Applicants believe that this patent number is the same as Sweitzer et al. Please see the discussion in the previous section.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claims 14-17 under 35 U.S.C. § 102 (b).

### CONCLUSION

Applicants believe that all claims pending, including claims 14-17, are now in condition for allowance so such action is earnestly solicited at the earliest possible date.

Should there be any additional charge or fee, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, please charge Deposit Account No. 02-2666.

If a telephone interview would in any way expedite the prosecution of this application, the Examiner is invited to contact the undersigned at (408)-720-8300.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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Dated: May 4, 2005

By: \_\_\_\_\_



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